

Math 10A
Fall 2023
Practice Midterm
May 12, 2023
Time Limit: 65 Minutes

Name (Print): _____

This exam contains 10 pages (including this cover page) and 5 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

- **Organize your work**, in a reasonably neat and coherent way, in the space provided. Work scattered all over the page without a clear ordering will receive very little credit.
- **Clearly indicate your final answer** by for example circling it.
- **Mysterious or unsupported answers will not receive full credit.** A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
- If you need more space, use the back of the pages; clearly indicate when you have done this.

Problem	Points	Score
1	20	
2	20	
3	20	
4	20	
5	20	
Total:	100	

Do not write in the table to the right.

1. Some but NOT all of the the following equations matches one of the graphs pictured on LAST page. For each equation, either circle the matching graph or circle GRAPH NOT PICTURED. You do not need to justify your answer.

(a) (5 points) $y = 1/(x + 2)$.

- A. Graph (1) B. Graph (2) C. Graph (3) D. Graph (4) E. Graph not pictured

(b) (5 points) $y = 1 - e^x$.

- A. Graph (1) B. Graph (2) C. Graph (3) D. Graph (4) E. Graph not pictured

(c) (5 points) $y = 2x + 1$.

- A. Graph (1) B. Graph (2) C. Graph (3) D. Graph (4) E. Graph not pictured

(d) (5 points) $y = (x + 1)^{2/3}$

- A. Graph (1) B. Graph (2) C. Graph (3) D. Graph (4) E. Graph not pictured

2. Find the following limits.

(a) (5 points)

$$\lim_{x \rightarrow 0} \frac{3}{\sqrt{3x+1} + 1}$$

(b) (5 points)

$$\lim_{x \rightarrow -5} \frac{x^2 + 3x - 10}{x + 5}$$

(c) (5 points)

$$\lim_{x \rightarrow 2} \frac{x + 2}{\sqrt{x^2 + 5x + 6}}$$

(d) (5 points)

$$\lim_{x \rightarrow 0} \frac{5x^3 + 8x^2}{3x^4 - 16x^2}$$

3. Consider the function

$$f(x) = \begin{cases} 3 - x & \text{if } x < 2; \\ 10 & \text{if } x = 2; \\ \frac{x}{2} + 1 & \text{if } x \neq 0 \text{ and } x > 2. \end{cases}$$

(a) (5 points) Sketch the graph of $y = f(x)$.

(b) (5 points) Compute the 1-sided limit $\lim_{x \rightarrow 2^+} f(x)$

(c) (5 points) Compute the 1-sided limit $\lim_{x \rightarrow 2^-} f(x)$

(d) (5 points) List all points where $f(x)$ is discontinuous. If there are no such points, write **THERE ARE NO DISCONTINUITIES**.

4. Find the following limits.

(a) (5 points)

$$\lim_{x \rightarrow \infty} \frac{2 + \sqrt{x}}{2 - \sqrt{x}}$$

(b) (5 points)

$$\lim_{x \rightarrow -\infty} \frac{2x + 3}{5x + 7}$$

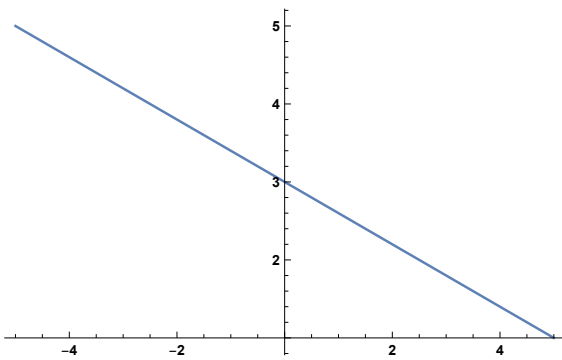
(c) (5 points)

$$\lim_{x \rightarrow \infty} \frac{3x + 7}{\sqrt{x^2 - 2}}$$

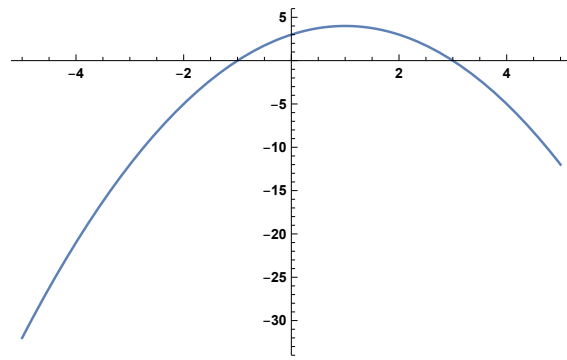
(d) (5 points)

$$\lim_{x \rightarrow 0} \frac{1}{x^{1/3}} - \frac{1}{(x-1)^{4/3}}$$

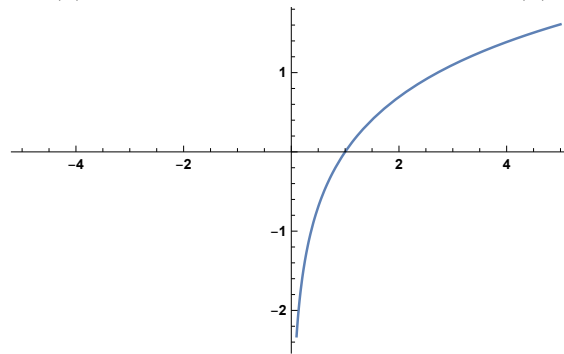
5. (20 points) Write down an equation of the tangent line to the graph of $f(x) = x^2 + 1$ at the point $(2, 5)$. Write your answer in the form $y = ax + b$.



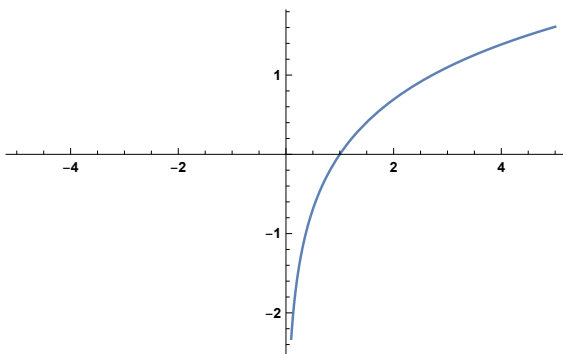
(a) Graph (1)



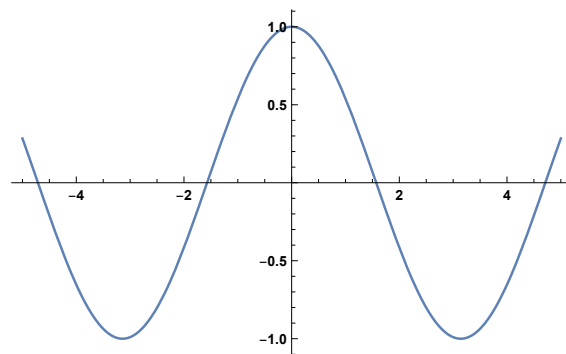
(b) Graph (2)



(c) Graph (3)



(a) Graph (3)



(b) Graph (4)